

User's Manual

Custom Sensors Model CCD8000 Scanner

Introduction

The Model CCD8000 Scanner is designed for Point of Sale or Office use. Three interfaces are provided. The Keyboard Wedge interface connects between a PC keyboard and the computer console. When scanned, the characters in the barcode appear as though they were typed on the keyboard. The USB interface behaves like the keyboard wedge, except it connects to the computer through its USB port, rather than the keyboard port. The RS-232 interface can be connected to a Com: port on a PC or any other device with an EIA/TIA RS-232C interface.

The Scanner has a wide reading aperture and is designed to operate in contact with, or close to, the barcode symbol being scanned. The scanner can be up to $\frac{3}{4}$ inch from the code. When the switch is pressed, the light source illuminates the barcode. The code is read and decoded, a beeper sounds and the indicator light flashes. The illumination is then extinguished. This process normally takes less than a second.

The unit will read barcodes up to 3 inches long. Most common linear barcode symbologies are supported, including EAN/UPC, Code39, Code128, Codabar, Interleaved 2 of 5, Industrial 2 of 5, Matrix 2 of 5, DataLogic 2 of 5, Code93, IATA, MSI/Plessey, and Code11.

Installation

The three standard interfaces, Keyboard Wedge, USB and RS-232 are accomplished through the use of separate cable assemblies. When a unit is ordered with one of these interfaces, the proper cable assembly is shipped with the unit. The cable assemblies contain a telephone-type connector, which mates with a connector at the rear of the scanner. It is possible to change the scanner's interface by changing the cable. Cables are available from Custom Sensors.

The Keyboard Wedge Interface.

The model with the keyboard wedge interface connects between the keyboard and the console of the computer. This model is available with two types of connectors; the 5-pin DIN or the 6-pin mini-DIN. Both units connect in the same manner. Turn off power to the computer. Unplug the keyboard cable. Plug the keyboard cable into the female connector on the scanner cable. Plug the male connector on the scanner cable into the computer keyboard connection. The scanner derives its power from the computer, so no external power supply is necessary. Turn on the Computer. The scanner should emit an audible tone.

To test the installation, start an application on the computer, such as a word processor, that displays characters typed on the keyboard. Review the section on *Using CCD Scanners*, later in this manual, if necessary. Scan the barcode below. The scanner should emit



a tone. The characters in the barcode should appear as though they were typed on the keyboard.



The USB Interface.

The USB model will connect to the computers USB interface. Plug in the unit with the computer running. The USB model uses Human Interface Device Drivers that are built into any operating system that supports USB. During the installation you may be prompted to insert you operating system disk. After installation is complete, check Windows Device Manager. You should find a listing for Human Interface Devices, and the scanner will be listed as a human interface Device under that category. The barcode scanner will emulate a USB keyboard. In operation it will act just like the Keyboard wedge model. Test the USB interface like the Keyboard Wedge interface above.

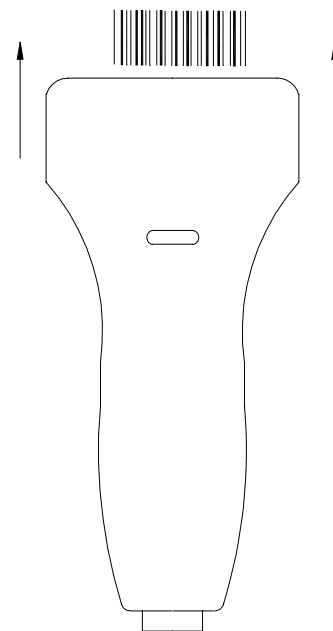
PIN	NAME
1	Shld
2	TxD
3	RxD
4	N/C
5	GND
6	N/C
7	CTS
8	RTS
9	+5V

Connector
Wiring.

The RS-232 Interface.

The model with the RS-232 interface is designed to connect to the Com: port of a Personal Computer, or other RS-232 Device. The connector is wired in DCE configuration. It will connect to the port without the requirement for a null-modem cable. An external power supply is required, since there is no power available from a standard RS-232 connector. An accessory power supply, Model APS002 is available from Custom Sensors. If another power supply is used, it must be regulated 5VDC \pm 10% @ 200 milliamps minimum and must have a power connector that is 5.5mm outside diameter and 2.1mm inside diameter. The center is positive. The RS-232 connector is a type DB-9S and is wired as shown in the table.

Apply power to the scanner, but do not connect the RS-232 cable. The default mode of operation of this scanner is Keyboard wedge. The first task is to change this to RS-232. Turn to page 2-4 of this manual. Scan the START code at the top of the page. The scanner should respond by sounding a series of tones. Scan the *Use RS-232 Interface* barcode on that page. Scan the END code at the top of the page. The scanner is now configured for RS-232 operation. The communications parameters are: 9600 Baud, 8 Data Bits, and No Parity. RTS/CTS handshaking is disabled. These parameters can be changed as outlined in part two of this manual.



Using CCD Scanners

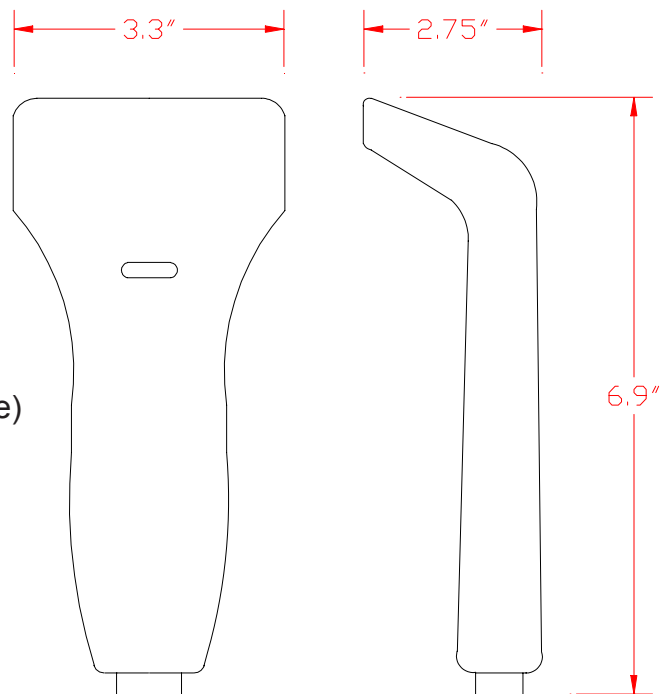
The CCD Scanner reads barcodes through the elongated front opening in the scanner. The scanner is normally placed on the code so that the code is centered in this opening. When the button on the bottom of the scanner is pushed, the scanner light source is switched on and illuminates the barcode. A CCD (Charge Coupled Device), similar to that used in digital cameras, registers an image of the barcode. A microcomputer within the scanner decodes this image into the characters represented by the barcode, and sends them to the Keyboard Wedge or RS-232 Interface. An audible tone is heard, the illumination is turned off, and an indicator on the scanner flashes when the code has been read. The button can then be released.

CCD scanners usually work in contact, or close contact, with the barcode. The easiest way to align the scanner with the code is to place the rectangular opening over the barcode. In many cases a useful technique is to place the scanner on the surface containing the barcode, so the code can be seen above the top of the scanner. With the button pressed, move the scanner up on to the code until the tone sounds indicating a good read. Even though this model will work up to 0.75 inch from the barcode, it is usually easiest to use it in contact.

CCD Scanners differ from laser scanners in that they form an image of the code rather than scanning it. CCD scanners have no moving parts and the light source does not require the safety precautions associated with a laser.

Mechanical Specifications

Weight: About 5 oz. (without cable)
Case: ABS Plastic
Dimensions: See Drawing



TROUBLESHOOTING

The following items illustrate common problems encountered in the initial installation of the CCD Scanner.

Common Scanning Problems

A barcode will not read, no tone is heard or indicator does not flash.

Make sure that the barcode is not wider than the scanner opening. Remember, the width of the code also includes quiet zones, equal to 10 times the width of a narrow bar, at each end of the code.

Make sure the code is approximately centered in the scanner opening.

Make sure that the scanner will read that barcode type, and that type is enabled. See Page 2-10 of this manual.

Make sure that the code is of reasonable quality in that the printing is not smeared and there seems to be good contrast between the bars and spaces.

Keyboard Wedge Configuration.

Connectors will not fit the keyboard.

The scanner can be ordered with the two most popular connectors used on IBM PC and PC compatible keyboards; the 5-pin DIN connector and the 6-Pin mini-DIN connector. If these connectors do not match your keyboard, check Page 2-2 of this manual to make sure that this scanner will function with your keyboard. Adapters may be necessary to interface to your keyboard.

The scanner beeps and the indicator flashes, but no data appears on the screen.

Make sure that the scanner is configured as a keyboard wedge. Since this is the default interface, scan the SET code on the top of any even page of Section 2. Scan the codes for the keyboard type and language on page 2-2. Scan the End Code.

Type a few characters on the keyboard to test the connection. If characters do not appear on the screen, check each cable connection as well as the connection to the scanner.

Only some of the characters that are in the barcode appear on the screen.

Slow down the speed at which the data is sent from the scanner. Page 2-3 in the next section shows how to accomplish this.

USB Configuration.

The scanner beeps and the indicator flashes, but no data appears on the screen.

Make sure that the scanner is configured as a keyboard wedge. Since this is the default interface, scan the SET code on the top of any even page of Section 2. The USB interface is actually a PS/2 to USB converter, so the scanner itself is configured for Keyboard Wedge. If the scanner has somehow been configured for RS-232, it will not output data.

The CCD8000 emulates a USB keyboard. To an operating system it is considered a Human Interface Device. If your operating system is Windows, the scanner will appear as a Human Interface Device in Windows Device Manager. There should be similar entries for operating systems such as Mac OS and Linux. If the scanner does not appear in the listing, unplug the scanner and reboot the system. Plug in the scanner with the system running. You should receive an indication from the operating system that it is installing a Human Interface Device.

RS-232 Configuration

The scanner beeps and the indicator flashes, but no data seems to be transmitted.

Make sure the scanner is set up as an RS-232 device. Even if the scanner has the correct cable installed, it must still be properly configured. Note that the default configuration for the scanner is Keyboard Wedge. RS-232 configuration parameters are configured on Pages 2-4 and 2-5.

Make sure the Baud Rate, Word Length and Parity of the scanner match the host device being communicated with.

Make sure that the “handshake” requirements of the scanner and the host device agree.

Check the connection to the host device. The Scanner is configured as DCE (Data Communications Equipment). It can connect to a device configured as DTE (Data Terminal Equipment) with a straight cable. Make sure a null-modem cable is not being used.

Use a breakout box or other tester to determine if data is being transmitted from the scanner and not being received properly. This device will also indicate the status of the handshake lines.

Test Barcodes

Code 39



Interleaved 2 of 5



Code 128



UPC-A



EAN-13



Bookland



UPC-E



EAN-8



UPC w/ 5 digit supplemental



Codabar



Scanner Configuration

Introduction

The Custom Sensors CCD8000 Series scanners can be configured by scanning the barcodes in this manual. There are four special barcodes that are used in the configuration process. These are the Start, End, Abort and Set codes. These codes appear at the top of every even page so that they are readily available at any point in the configuration process. Their function is as follows:

The **START** code begins the configuration process. It signals the scanner that the Configuration Mode is being entered and that barcodes it will be reading are the barcodes in this manual.

The **ABORT** code signals the scanner to disregard any configuration changes made since the START code was scanned, as long as the END code has not been scanned. In effect, it ends the Configuration process with no changes made. To start again scan the START code.

The **END** code ends the Configuration process and returns the scanner too its normal operating mode.

The **SET** code sets all scanner parameters to their default values. Unless the scanner was ordered with a special configuration, this resets the scanner to the configuration it contained when it was received. Notice that each parameter listed in this manual has a default value. This code can be scanned at any time. The START code does not have to be scanned first.

The Default Configuration is as Follows:

- Keyboard Wedge Interface
- IBM PC/AT and PS/2 series Computers
- US Keyboard Layout
- Code 39, Codabar and EAN/UPC codes enabled
- Read Mode: Trigger on/Good Read off
- Good Read beep active
- Keyboard number keys: alphanumeric
- Preamble and Postamble: None

Each of the above parameters will be explained in the following Sections of this Manual.

START



START

END

END



ABORT



ABORT

SET

SET



The Scanner Communications Settings.

The scanner has three communications methods. The Default is Keyboard Wedge interface. *The USB interface is actually a PS/2 to USB converter attached to a Keyboard Wedge scanner, so it should be treated as a Keyboard Wedge interface.* The other is RS-232. The Keyboard Wedge/USB will be listed first.

Keyboard Wedge/USB Parameters

Select the type of keyboard being used. The Default is the PC/AT and PS/2 Models 50, 60 and 80. *The USB interface must use this setting. A Keyboard Wedge scanner can use any of the other available types.*

PC/AT PS/2-50/60/8



Thinkpad



PC/XT



ACER 7300



IBM5550



Macintosh (ADB)



NEC 9800



Select the keyboard layout from one below. The Default is the US keyboard.

US



Germany



French



Spanish



Swiss



UK



CUSTOM SENSORS, INC.

The wedge can send alpha characters as either upper case or lower case. Default is lower case. This does not apply to full ASCII codes, such as Extended Code 39 or Code 128.

Upper



Lower



The number keys option controls whether the wedge sends numbers as the keys on the top row of the keyboard (Default), or as the keypad keys. Some programs are designed to receive numeric input only from the keypad. Note: The Num Lock must be enabled if the keypad is used.

Keyboard



Keypad



The speed at which the barcode data is sent to the keyboard port can be changed. By default, data is sent at the fastest rate. The rate can be slowed using the codes below. Scan the START code on Page 2, one of the codes below, then the END code on Page 2.

Fastest (Default)



Fast



Medium



Slow



Slowest



START



START

END

END



ABORT



ABORT

SET

SET



RS-232 Parameters

To set the Scanner to RS-232 communications, scan the code below. Note that in order for the scanner to function in this mode it must be equipped with the RS-232 cable and will also require an external power supply. To return to the keyboard wedge mode, scan the "Return to Wedge" code below.

RS-232



Return to Wedge



After Selecting RS-232, select the desired baud rate. Note that the default communications parameters are: 9600 baud, 8 data bits, No Parity, 1 Stop Bit.

1200 baud



2400 baud



4800 baud



9600 baud



19200 baud



38400 baud



Select the number of data bits. Both 7 and 8 bit data words are available.

7 Bit Word



8 Bit Word (Default)



Select parity from the choices below. Normally No parity is used with an 8 bit data word. Mark, Space, Even or Odd parity is selected for a seven dit data word.

No Parity (Default)



Even Parity



Odd Parity



Select a Handshaking protocol. These protocols involve the use of the RTS and CTS control signals. Select None if RTS/CTS will not be used. RTS will be driven high (True) when the scanner is powered on. The CTS line will be used to control data transmission. That is, data will only be transmitted when CTS is true. The Xon/Xoff software protocol is also available to control data transmission. When using this protocol, remember that the scanner cannot buffer multiple reads.

None (Default)



RTS/CTS



Xon/Xoff





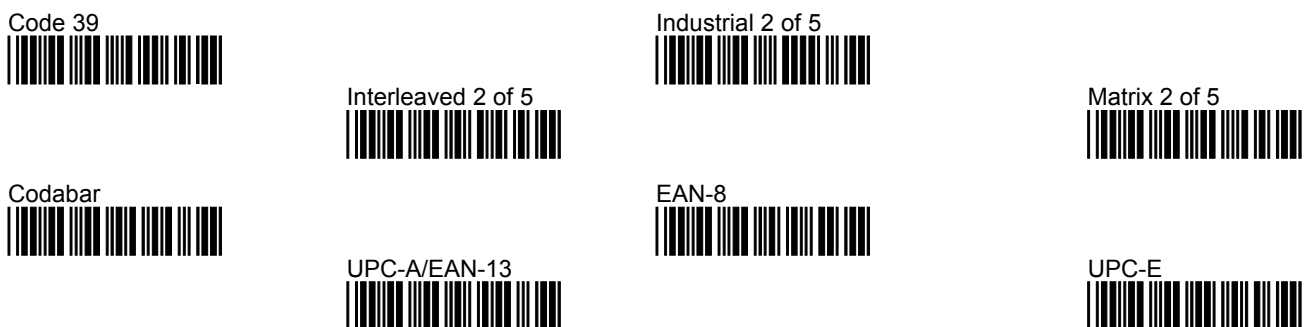
General Parameters

This Section sets some general configuration parameters that are independent of the type of interface being used.

Select a **Terminator Character(s)** to be used in the data transmission. The terminator is always transmitted last and indicates the end of transmission. In RS-232 a CR (Carriage Return) is most often used. With the keyboard wedge interface, a TAB is often used to send the cursor to the next data field.



An **ID Character** can be assigned to each code type. ID characters are used in situations where the scanner may be reading several barcode types and it is desired to know which type was read. A single ID character, which can be any ASCII character, can be assigned to any or all code types. The character will be transmitted, immediately preceding the barcode data, as part of the keyboard wedge or RS-232 transmission. To assign a character, scan START and then scan one of the codes below that corresponds to the code type to which the identifier will be assigned. Next, turn to the Appendix B Find the Hex value of the identifier character. Then turn to Appendix C and scan the barcodes for the two numbers of the Hex value. Scan the Set code in Appendix C. Scan the END Code at the top of any page.



Code 11



Code 128



MSI/Plessey



Up to a 10 character long **Preamble and Postamble** may be specified as part of the data transmission. The Preamble field is transmitted before the barcode data. The Postamble field will be transmitted after the barcode data. If an ID character is specified the default order of transmission will be: Preamble Field - Code ID Character - Barcode Data - Postamble Field - Terminator Character(s). If an ID or Terminator is not specified they are deleted from the transmission.

To define a Preamble, scan Start and then the Define Preamble label below. Proceed to Appendix B, and look up the Hexadecimal Value for each character that will be in the preamble. For example: if the preamble were "abc", the Hex Values would be 61, 62 and 63. Proceed now to appendix C. Scan the barcode for 6, then 2, then 6, then three, then 6 and finally 3. Scan the Set code at the bottom of the page. Scan the END code at the top of any page. The Postamble field is programmed identically to the Preamble.

Define Preamble



Define Postamble



Several different **Operation Modes** may be selected. To select a mode, scan the START code at the top of any page. Scan the code corresponding to that mode, then scan the END code. These modes are:

Trigger On/Off - The time that the light source will be on and the scanner reading, is controlled directly by the trigger switch. Closing the switch will let scanner read. As soon as a good read occurs, the data is transmitted and the tone sounds. The light will remain on until the switch is released.

Trigger On.Off





Trigger On / Good Read Off - The trigger switch controls the start of the reading process. When the trigger is pressed, the light source is turned on. When a good read is achieved, the light is turned off and the data is transmitted. If a read has not been made within 3 seconds, the light is turned off and no transmission is made. This is the default mode of operation.



Direct Trigger Control - The light source is turned on and the scanner is enabled to read by pressing the trigger switch. The trigger must be released and pressed again to end the reading process.



Always On - Pressing the trigger switch will turn the light source on and start the reading process. Once a code is read, a different code must be seen (or the same code removed from the scanners view) before another read will occur.



















Always On Continuous reading - Pressing the trigger switch will turn the light source on and start the reading process. The scanner will output data every time it successfully decodes a barcode.












Settings for Specific Barcode Types.

Enable Specific Code Type.

In the Default scanner configuration the following codes are enabled: Code 39, Codabar and EAN/UPC. The remaining code types are disabled. To enable the scanner to read, or not to read, a specific code type, scan the ON or OFF barcode label below, associated with that code type.

Code Type	ON	OFF
Code 39	Code 39 On 	Code 39 Off 
Interleaved 2 of 5	Interleaved 2 of 5 On 	Interleaved 2 of 5 Off 
Industrial 2 of 5	Industrial 2 of 5 On 	Industrial 2 of 5 Off 
Matrix 2 of 5	Matrix 2 of 5 On 	Matrix 2 of 5 Off 
Codabar	Codabar On 	Codabar Off 
EAN-13/UPC-A	EAN-13/UPC-A On 	EAN-13/UPC-A Off 
EAN-8	EAN-8 On 	EAN-8 Off 
UPC-E	UPC-E On 	UPC-E Off 



Code Type	ON	OFF
EAN/UPC Add-on	EAN/UPC Add-on O 	EAN/UPC Add-on O 
Code 128	Code 128 On 	Code 128 Off 
Code 11	Code 11 On 	Code 11 Off 
MSI/Plessey	MSI/Plessey On 	MSI/Plessey Off 
DataLogic 2 of 5	Datalogic 2 of 5 On 	Datalogic 2 of 5 Off 

Specific UPC/EAN Parameters

Scanning the following barcodes controls various parameters for the EAN/UPC family of codes. These parameters can be controlled separately for UPC-A, EAN-13, UPC-E and EAN-8. The first digit of the code can be truncated, that is, not included in the data transmission. It can be truncated only if it is a zero, or truncated for any value. The Check digit, which is the last digit in the code, can be also be transmitted or not.

For EAN-13:

Truncate Leading Digit

Yes



No



Truncate Leading Zero

Yes



No



Transmit Check Digit

Yes



No



For UPC-A:

Truncate Leading Digit

Yes



No



Truncate Leading Zero

Yes



No



Transmit Check Digit

Yes



No



For EAN-8:

Truncate Leading Digit

Yes



No



Transmit Check Digit

Yes



No





For UPC-E:

Truncate Leading Digit



Transmit Check Digit



Specific Code 39 Parameters.

This Section configures parameters associated with the Code 39 barcode type. There are two types of Code 39, the Standard and Full ASCII versions. The standard version encodes the numbers 0 thru 9, the upper case letters A thru Z and the characters: space, -, ., *, \$, /, + and %. The Full ASCII, or extended, version encodes all 128 ASCII characters. The additional, or extended, characters are encoded as character pairs, resulting in a longer code.

The Start and Stop characters, which are the asterisk (*) character, can be transmitted along with the other characters in the code.

Code 39 may be printed with a check digit. If so, this scanner has the options of calculating the check and transmitting it as part of the data transmission. If the check digit calculation fails, no transmission is made.

Code Type



Transmit Start Stop Characters



Verify Check Character

Yes



No



Transmit Check Character

Yes



No



Interleaved 2 of 5 Code Parameters.

For the Interleaved 2 of 5 code type can be printed with a check digit. The scanner can be programmed to verify that this check digit is correct. It can also be programmed to include the check digit in the data transmission, if desired.

Because of certain characteristics of the Interleaved two of five code, it is recommended that a fixed code lengths be used. This prevents problems of reading fewer characters than are actually in the barcode. As the scanner is received, it is programmed to read any length, up to 30 characters. Up to three fixed lengths can be programmed. To program a fixed length, scan the "Define Length" barcode below. The length entered must be expressed as a Hexadecimal number, rather than decimal. Turn to the table in Appendix A to convert the desired length to a Hexadecimal number. For example, for a length of 10, the Hexadecimal number would be 0A. Next, turn to Appendix C. Scan the barcode for 0, then the code for A. Make sure to only scan each code once. If an error occurs, scan the Abort code above, and restart. Scan the Set code in Appendix C. Scan the End code at the top of any page.

Transmit Check Digit

Yes



No



Verify Check Digit

Yes



No



Define Length





Industrial 2 of 5 Parameters

For the Industrial 2 of 5 code type can be printed with a check digit. The scanner can be programmed to verify that this check digit is correct. It can also be programmed to include the check digit in the data transmission, if desired.

Because of certain characteristics of the Industrial two of five code, it is recommended that a fixed code lengths be used. This prevents problems of reading fewer characters than are actually in the barcode. As the scanner is received, it is programmed to read any length, up to 30 characters. Up to three fixed lengths can be programmed. To program a fixed length, scan the "Define Length" barcode below. The length entered must be expressed as a Hexadecimal number, rather than decimal. Turn to the table in Appendix A to convert the desired length to a Hexadecimal number. For example, for a length of 10, the Hexadecimal number would be 0A. Next, turn to Appendix C. Scan the barcode for 0, then the code for A. Make sure to only scan each code once. If an error occurs, scan the Abort code above, and restart. Scan the Set code in Appendix C. Scan the End code at the top of any page.

Transmit Check Digit



Yes



No

Verify Check Digit



Yes



No



Define Length

Matrix 2 of 5 Code Parameters

For the Matrix 2 of 5 code type can be printed with a check digit. The scanner can be programmed to verify that this check digit is correct. It can also be programmed to include the check digit in the data transmission, if desired.

Because of certain characteristics of the Industrial two of five code, it is recommended that a fixed code lengths be used. This prevents problems of reading fewer characters than are actually in the barcode. As the scanner is received, it is programmed to read any length, up to 30 characters. Up to three fixed lengths can be programmed. To program a fixed length, scan the “Define Length” barcode below. The length entered must be expressed as a Hexadecimal number, rather than decimal. Turn to the table in Appendix A to convert the desired length to a Hexadecimal number. For example, for a length of 10, the Hexadecimal number would be 0A. Next, turn to Appendix C. Scan the barcode for 0, then the code for A. Make sure to only scan each code once. If an error occurs, scan the Abort code above, and restart. Scan the Set code in Appendix C. Scan the End code at the top of any page.

Transmit Check Digit

Yes



No



Verify Check Digit

Yes



No



Define Length



DataLogic 2 of 5 Code Parameters.

For the DataLogic 2 of 5 code type can be printed with a check digit. The scanner can be programmed to verify that this check digit is correct. It can also be programmed to include the check digit in the data transmission, if desired.

Because of certain characteristics of the Interleaved two of five code, it is recommended that a fixed code lengths be used. This prevents problems of reading fewer characters than are actually in the barcode. As the scanner is received, it is programmed to read any length, up to 30 characters. Up to three fixed lengths can be programmed. To program a fixed length, scan the “Define Length” barcode below. The length entered must be ex-

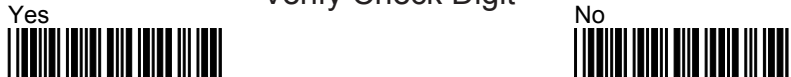


pressed as a Hexadecimal number, rather than decimal. Turn to the table in appendix A to convert the desired length to a Hexadecimal number. For example, for a length of 10, the Hexadecimal number would be 0A. Next, turn to Appendix C. Scan the barcode for 0, then the code for A. Make sure to only scan each code once. If an error occurs, scan the Abort code above, and restart. Scan the Set code in Appendix C. Scan the End code at the top of any page.

Transmit Check Digit



Verify Check Digit



Specific Codabar Parameters

For the Codabar code type, there can be various sets of start and stop characters. In some applications, the value of the start and stop characters are just as important as the barcode data itself. Transmission of the start and stop characters, as well as the character sets used, can be programmed by scanning the barcodes below.

Transmit Start and Stop Characters



Start / Stop Character set.



Specific Code 11 Parameters

Code 11 can be printed with either one or two check digits. The check digits are never transmitted. Scanning the barcodes below programs the scanner to expect one or two check digits. The scanner can verify that the check digits are correct, or ignore them.

Number of Check Digits

One



Two



Verify Check Digit

Yes



No





Appendix A

The table below is used to convert the desired code length to a Hexadecimal number. Locate the desired code length in the left column, then read the corresponding Hexadecimal value in the right column.

Decimal	Hex	Decimal	Hex
1	01	17	11
2	02	18	12
3	03	19	13
4	04	20	14
5	05	21	15
6	06	22	16
7	07	23	17
8	08	24	18
9	09	25	19
10	0A	26	1A
11	0B	27	1B
12	0C	28	1C
13	0D	29	1D
14	0E	30	1E
15	0F	31	1F
16	10	32	20

Appendix B

Use Appendix B to enter Preamble and Postamble field. Each character in the Preamble or Postamble must be entered as a two character Hex value. Look up the value of each character in the Table below.

Character	Hex Value	Character	Hex Value	Character	Hex Value
Space	20	A	41	b	62
!	21	B	42	c	63
"	22	C	43	d	64
#	23	D	44	e	65
\$	24	E	45	f	66
%	25	F	46	g	67
&	26	G	47	h	68
'	27	H	48	i	69
(28	I	49	j	6A
)	29	J	4A	k	6B
*	2A	K	4B	l	6C
+	2B	L	4C	m	6D
,	2C	M	4D	n	6E
-	2D	N	4E	o	6F
.	2E	O	4F	p	70
/	2F	P	50	q	71
0	30	Q	51	r	72
1	31	R	52	s	73
2	32	S	53	t	74
3	33	T	54	u	75
4	34	U	55	v	76
5	35	V	56	w	77
6	36	W	57	x	78
7	37	X	58	y	79
8	38	Y	59	z	7A
9	39	Z	5A	{	7B
:	3A	[5B		7C
;	3B	\	5C	}	7D
<	3C]	5D	~	7E
=	3D	^	5E		7F
>	3E	_	5F		
?	3F	`	60		
@	40	a	61		



Appendix C

Appendix C contains the Barcodes that correspond to the Hexadecimal characters. Notice that when any character is converted to a hexadecimal value in Appendix B, that the character consists of numbers 0 thru 9 and characters A thru F.

